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     (FILE 'USPAT' ENTERED AT 07:09:57 ON 07 APR 1999)
L1          62503 S (PERSON## OR INDIVIDUAL# OR HUMAN OR PORTABLE OR BODY)(4
A)(
L2           1321 S L1 AND (GLOBAL POSITION### SYSTEM OR GPS OR SATELLITE#)
L3         100713 S (SEAL### OR O RING)(3A)(ENCLOS### OR CASE OR HOUS### OR
CON
L4             41 S L2 AND L3
L5         155033 S DATA(2A)(STOR### OR MODEM OR TRANSMISSION#)
L6             17 S L5 AND L4
L7           1501 S FIELD PROGRAM? GATE ARRAY# OR FPGA
L8              0 S L7 AND L6
L9              0 S L7 AND L4
L10             6 S L7 AND L2
L11             7 S MATCH### FILTER###(P)GPS RECEIVER#
L12             0 S L11 AND L10
L13             0 S L11 AND L6
L14             0 S L11 AND L4
L15             1 S L11 AND L2
L16         12876 S (TAMPER### OR REMOV###)(3A)(DETECT### OR SENS###)
L17             0 S L16 AND L10
L18             0 S L16 AND L15
L19             5 S L16 AND L6
L20          2290 S VIBRAT###(P)(ALARM### OR ALERT###)
L21             0 S L20 AND L10
L22             0 S L20 AND L15
L23             0 S L20 AND L19
L24            15 S L20 AND L2
L25           601 S (RULE# OR LOCATION)(3A)CONSTRAINT#
L26             0 S L25 AND L4
L27             6 S L25 AND L2
L28             1 S L27 AND SCHEDULE#(2A)RULE#
L29          6729 S (BACKUP OR BACK-UP)(2A)(BATTER### OR POWER###)
L30             4 S L29 AND L4
L31        527008 S HEALTH# OR PHYSI?
L32         23591 S (FREQUENT## OR INTERVAL#)(P)L31
L33             7 S L32 AND L6

=> d l10 2 3
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2. 5,831,574, Nov. 3, 1998, Method and apparatus for determining the location of an object which may have an obstructed view of the sky; Norman F. Krasner, 342/357; 701/213 [IMAGE AVAILABLE]

3. 5,790,076, Aug. 4, 1998, Tracking sensor specially for computer applications; Jozef Sypniewski, 342/365, 457, 465 [IMAGE AVAILABLE]

=> d l10 2 ab detd(21)

US PAT NO: 5,831,574 [IMAGE AVAILABLE] L10: 2 of 6

ABSTRACT:
A positioning sensor receives and stores a predetermined record length of positioning signals while in a fix position located such that the positioning sensor can receive positioning signals. Thereafter, the stored positioning signals are processed to determine the geographic location of the fix position. The fix position may correspond to a

location of an object of interest or it may be in a known location relative to the position of the object, in which case once the geographic location of the fix position has been computed, the geographic location of the object can be derived. The positioning sensor includes a Snapshot **GPS** receiver which may collect and process **GPS** signals transmitted by **GPS satellites** using fast convolution operations to compute pseudoranges from the **GPS satellites** to the fix position. Alternatively, these computations may be performed at a basestation. The computed pseudoranges may then used to determine the geographic location of the fix position. The positioning sensor may be equipped with depth sensing means, such as a pressure sensor, which allows a determination of the depth of submerged object to be made. The positioning sensor may further be equipped with signal detecting means for determining when the positioning sensor is in the fix position.

DETDESC:

DETD(21)

In addition to the embodiments described above, positioning sensor 10 may also be used to track the movement of the dolphin (or other remote vehicle) itself. That is, in situations where it is the movement of the dolphin which is of interest (e.g., during scientific research, etc.), positioning sensor 10 may be used to relay positioning information back to basestation 50 (assuming positioning sensor 10 is fitted with a modem or other communication device as further discussed below). This embodiment may have other applications, for example, **tracking** of vehicles, **persons** or other objects operating in canyons (urban or otherwise) and other areas where only intermittent views of the sky are available is facilitated. Further, positioning sensor 10 may allow for the tracking of spinning or tumbling projectiles (e.g., missiles) where an antenna 16 is fitted on only one side of the projectile and, hence, has only very brief views of the sky as the projectile spins or tumbles about an axis in flight.

=> d l10 3 ab bsum(10) bsum(13) detd(6)

US PAT NO: 5,790,076 [IMAGE AVAILABLE] L10: 3 of 6

ABSTRACT:
The multi-dimensional tracking sensor especially for virtual reality and other real time computer applications. The disclosure describes an electro-magnetic (EM) tracking sensor that consists of a small lightweight transmitter with a transmitting antenna located on the target to be tracked and an array receiver with several local stationary antenna elements (FIG. 1). Multiple antenna elements of the array receiver lie on the perimeter of the measured space in positions determined by a self-calibration procedure. The proposed device calculates a cross correlation function between two signals at each receiving unit to determine a spatial position of the tracked element.

SUMMARY:

BSUM(10)

In addition these sensors have applications: in automobile crash testing where geometrical data has to be logged directly during the test and in the medical field of rehabilitation and injury claims where this device can **track** movement of the **human body**. The total list of possible uses of multi-dimensional tracking sensor is very diverse; animation, teleoperation, and training simulation are representatives of current uses. As the enabling technology becomes refined, applications will multiply.

SUMMARY:

BSUM(13)

The problem of creating at least three degree-of-freedom (3D) tracking devices is a long-standing one and publications have existed in this field for many years. There are a variety of original attempts to determine the position and movement of a target. The recent example is a **global positioning system** (**GPS**) where the signal received from at least four **satellites** can give the position of the receiver. Loran C operates on a similar principle that is based on ground deployed radio beacons. Over the course of time many tracking systems were developed to track moving vehicles. Most of them employ either directional antennas or they compare the phase of the arriving signal to the different parts of the multi-section antennas. While these systems perform well in their applications, either speed, accuracy or cost prohibits their employment in real time computer applications.

DETDESC:

DETD(6)

The M, S.sub.n system forms a conventional telemetric channel. The transmitter (FIG. 2) consists of system clock (CL) and a **field programmable gate array** chip that performs a state machine (SM) type function. If the system is required to operate at a frequency higher than the maximum clocking speed of the chip, than the output signal can be mixed with a high frequency carrier or preferably multiplied (MU) by an amplifier operating deeply in C class. The signal from MU is sent to the power amplifier (PA) followed by the omnidirectional antenna (ANT). In many applications of short distance tracking blocks MU and PA can be omitted.

=> d l15 1

1. 5,825,327, Oct. 20, 1998, **GPS** receivers and garments containing **GPS** receivers and methods for using these **GPS** receivers; Norman F. Krasner, 342/357; 701/213, 215 [IMAGE AVAILABLE]

=> d l15 ab bsum(7)

US PAT NO: 5,825,327 [IMAGE AVAILABLE] L15: 1 of 1

ABSTRACT:
A **GPS** receiver having multiple **GPS** antennas. Also described is a method of tracking employing the **GPS** receiver and a communication transmitter. Also described is a garment having a **GPS** receiver and a **GPS** antenna and a communication antenna and a communication transmitter.

SUMMARY:

BSUM(7)

The combination of **GPS** systems and other communications is receiving considerable interest, especially in the areas of **personal** and property **tracking**. An example of such a combination is shown in U.S. Pat. No. 5,225,842. The communication link allows a **GPS** receiver **located** on a mobile **person** or object to transmit its accurately determined position to remote locations which monitor this activity. Applications of the technology include security, truck fleet tracking, emergency response, inventory control, etc. The prior art has performed such combinations by mating separate **GPS** receivers and communication

systems using suitable electronic interfaces between the two, for example, serial communication ports, etc. Moreover, these systems use conventional serial correlating approaches to acquiring and tracking **GPS satellite** signals.

=> d 119 1 2 4

1. 5,455,851, Oct. 3, 1995, System for identifying object locations; John Chaco, et al., 379/38; 340/825.49; 379/37 [IMAGE AVAILABLE]

2. 5,396,227, Mar. 7, 1995, Electronic system and method for monitoring compliance with a protective order; Gary T. Carroll, et al., 340/825.36, 573.4, 825.54; 379/38 [IMAGE AVAILABLE]

4. 4,952,913, Aug. 28, 1990, Tag for use with personnel monitoring system; James D. Pauley, et al., 340/573.4, 514, 825.49; 455/100 [IMAGE AVAILABLE]

=> d 119 1 ab bsum(4) detd(38) detd(43)

US PAT NO: 5,455,851 [IMAGE AVAILABLE] L19: 1 of 5

ABSTRACT:
An objection location system for locating and communicating with personnel or objects within a facility. Remote badges are coupled to respective objects or personnel to be located. The badges include transmission means for transmitting identification information associated with their respective objects or personnel. Operational parameters are stored in the badges and are monitored for controlling the operation of the badges. The badge may be in the form of a wristband.

SUMMARY:

BSUM(4)

Location systems for locating objects or personnel within a facility are known. One type of personnel location system used in hospitals involves personnel within the facility reporting their locations by manually setting switches at designated areas. The switches are monitored at a central station and the locations of the personnel are determined by the locations of the activated switches. Other proposed personnel or object location techniques include systems which locate personnel or objects by seeking out where the object or personnel is closest to designated monitors. Such systems generally include a central controller connected to a plurality of transceivers distributed at designated locations throughout a facility. Portable units are worn or attached to objects or personnel to be **located**. Each **portable** unit is assigned a unique identification. To locate a personnel, the central controller causes the transceivers to broadcast or page the portable unit by its identification. The broadcast or page signal is received by the portable units but only the portable unit having a matching identification will respond with a confirmation signal, which is received by the transceiver **located** closest to the responding **portable** unit. The transceiver in turn reports to the central controller that it has received a confirmation signal. The **location** of the **portable** unit is determined by the central controller by the message received from the transceiver. Location systems employing such location technique are described in U.S. Pat. No. 4,649,385 to Aires et al. and U.S. Pat. Nos. 3,805,265, 3,805,226 and 3,696,384 to Lester. One problem with the systems of this type is in the portable units. They must include electronics with adequate sensitivity to receive signals broadcast from the transceivers and adequate power to transmit a reply. The portable units became bulky and cumbersome and therefore inconvenient to be worn

or attached.

DETDESC:

DETD(38)

Message type (2) may be used in messages sent directly from the receivers to the central computer 10. This message type is especially useful when **satellite** receivers (not shown) are connected to a standard receiver, preferably in a token ring network. **Satellite** receivers may include lesser components than a standard receiver but is capable of receiving signals from badges and relaying the information to a standard receiver for communication with the central computer 10. The **satellite** receivers may be more widely and conveniently distributed throughout the facility. The receiver connected to the **satellite** receiver may act as the hub and periodically polls the **satellite** receivers for information. The receiver then reports all the **satellite** receiver information in a reformatted message to the central computer 10.

DETDESC:

DETD(43)

The electronics as shown in FIG. 2 are integrated in a housing which may be removably attached to the bracelet. FIG. 6B illustrates the top view of the housing. FIG. 6C is the top view of the bracelet housing with the cover opened, exposing the electronic components therein. FIG. 6D is a side view of the bracelet housing. The dimension of the housing is no larger than 2.0" in length, 1.25" in width and 0.44" in thickness. The bracelet unit **housing** is preferably hermetically **sealed** and therefore waterproofed. The software programs are loaded into the ROM of microcontroller 101 prior to its installation in the bracelet housing. In the alternate embodiment, the bracelet unit does not mate with a personnel card and the card switch 105 is not used. The edge connector 103 is also eliminated to conserve space. Data can be read into the bracelet unit by strobing the light sensitive LED 108.

=> d l10 2 ab bsum(24) bsum(29) bsum(32) detd(14) detd(16)

US PAT NO: 5,831,574 [IMAGE AVAILABLE] L10: 2 of 6

ABSTRACT:

A positioning sensor receives and stores a predetermined record length of positioning signals while in a fix position located such that the positioning sensor can receive positioning signals. Thereafter, the stored positioning signals are processed to determine the geographic location of the fix position. The fix position may correspond to a location of an object of interest or it may be in a known location relative to the position of the object, in which case once the geographic location of the fix position has been computed, the geographic location of the object can be derived. The positioning sensor includes a Snapshot **GPS** receiver which may collect and process **GPS** signals transmitted by **GPS satellites** using fast convolution operations to compute pseudoranges from the **GPS satellites** to the fix position. Alternatively, these computations may be performed at a basestation. The computed pseudoranges may then used to determine the geographic location of the fix position. The positioning sensor may be equipped with depth sensing means, such as a pressure sensor, which allows a determination of the depth of submerged object to be made. The positioning sensor may further be equipped with signal detecting means for determining when the positioning sensor is in the fix position.

DETDESC:

DETD(14)

Where a dolphin or other marine mammal is used, it will be appreciated that special training will be required. Currently, marine mammals are used by various government agencies for applications similar to those required according to the present invention. In addition, marine mammals have long been featured at aquatic parks where they perform tricks which share many of the requirements of the present invention. Thus, the use of marine mammals according to the present invention is not a limiting factor.

DETDESC:

DETD(16)

When the dolphin surfaces, Snapshot **GPS** receiver 12 will take a fix as described in detail below. Snapshot **GPS** receiver 12 will be prompted to take such action in response to the receipt of an activation signal at positioning sensor 10. Many types of activation signals can be used and the type of signal used will depend on the configuration of positioning sensor 10. For an embodiment where positioning sensor 10 includes a separate signal detector 14 capable of receiving RF signals (see, e.g., FIGS. 1A and 1B), the activation signal may be an RF signal transmitted from basestation 50 while positioning sensor 10 is in the operating area. Alternatively, the **GPS** signals transmitted by the **GPS satellites** may act as activation signals. Signal detector 14 may be circuitry which is capable of detecting the **GPS** signals. Those skilled in the art will recognize that such signals are severely attenuated at even shallow depths. However, when the dolphin surfaces, antenna 16 (or another antenna used by signal detector 14) will be clear of the water and, hence, the **GPS** signals (or other activation signal transmitted at or near the **GPS** signal frequencies) will be detectable. In other embodiments, for example as shown in FIG. 1D, positioning sensor 10 may include a signal detector 14 which responds to other types of activation signals. these signals may include light intensity signals and, accordingly, sensor 15 would be capable of detecting light signals. As the dolphin submerges beneath the water, the amount of ambient light will decrease with depth. However, when the dolphin surfaces (assuming a daytime operation) the amount of ambient light will increase such that signal detector 14 will indicate that positioning sensor 10 is at the surface and, accordingly, a fix should be taken.

=> d 119 4 ab bsum(5) bsum(21) bsum(22)

US PAT NO: 4,952,913 [IMAGE AVAILABLE] L19: 4 of 5

ABSTRACT:

A tag for use with an individual monitoring system. The tag is worn by an individual being monitored, preferably on the ankle or leg where it can be concealed by the clothing of the individual. The tag is fully self **contained** and **sealed**. The circuits of the tag periodically generate an identification signal that includes an identification code. The identification signal modulates a stable RF signal that is transmitted in bursts of data words to a receiver associated with a field monitoring device (FMD) located at the monitoring location. In turn, the FMD may randomly establish communication with a central processing unit (CPU) located at a central monitoring location. Other information is included in the identification code of the tag, such as information indicating that an attempt has been made to remove the tag from the individual. The tag is held in place near the skin of it's wearer by a conductive strap that wraps around the leg or other limb of the individual. Two capacitive electrodes, one of which is realized with the

conductive strap, function as the plates of a capacitor, with the body flesh serving as the dielectric material therebetween. By monitoring an alternating signal coupled from one capacitive electrode to the other, a determination can be made as to whether the tag has remained near the body flesh. Further, because the strap is conductive, a signal can be passed therethrough and a determination can be made as to whether the strap has been broken.

SUMMARY:

BSUM(5)

While monitoring the presence or absence of a single **individual** at a prescribed **location** may seem like an easy task, it really is not. Moreover, where there are a large number of individuals who must be monitored, each at a different "house-arrest" location, the problem becomes exceedingly more complex, especially where some of the individuals may not want to fully comply with the need to wear the tag at all times. Hence, there is a need in the art for a system that can efficiently and accurately monitor the presence or absence of a large number of individuals who have been sentenced to remain at specific locations under house arrest. Advantageously, such a system could also be used to monitor the presence or absence of those individuals on parole, i.e., those individuals who are more or less free to move about as they want during certain hours of the day, but who must "report in" at specified locations at specified times. There is a further need to provide a tag that can be comfortably worn by those individuals being monitored but that can not be removed or **tampered** with without being **detected**.

SUMMARY:

BSUM(21)

The identification signal generated by the tag is received by a Field Monitoring Device (FMD) that is located within the house-arrest location. A repeater may be selectively positioned around or within the house-arrest facility in order to assure that the FMD always receives an identification signal regardless of the location of the tag (that is, regardless of the **location** of the **individual** wearing the tag) within the facility or surrounding environs. The repeater receives the information signal from the tag, holds it for a very short time, and retransmits it. The reception patterns associated with the FMD and the tag for all possible locations of the tag within the facility are checked at the time of installation. This initial check identifies any "dead spots" or tag locations where the tag's identificaion signal is not properly received by the FMD. The repeater can then be selectively positioned within the house-arrest facility in order to eliminate the effect of such dead spots, thereby helping to assure reliable communication between the tag and the FMD.

SUMMARY:

BSUM(22)

The FMD, in accordance with the preferred embodiment, includes a modem for communicating with a central processing unit (CPU) via a telephone link. Other types of communication links, such as microwave or **satellite** links, could also be employed to couple the FMD to the CPU. Normally, the FMD's will call the CPU whenever there is a change associated with the identification signal sensed (received) by the FMD. For example, if the identification signals have been regularly received from the tag and the signal stops being received, the FMD will call the CPU and log a "leave" message. If no signals are being received by the FMD and signals appear, the FMD will call the CPU and log an "enter"

message. Such time logs permit the system to determine the approximate time when an individual being monitored "checks out" or leaves and "checks in" or enters the house arrest location. Additionally, the various FMD's call the CPU at preestablished times stored by the FMD's and CPU's.

=> d 124 3 8

3. 5,838,237, Nov. 17, 1998, Personal alarm device; Graeme Charles Revell, et al., 340/573.1, 456, 539; 342/357 [IMAGE AVAILABLE]

8. 5,769,032, Jun. 23, 1998, Method and apparatus for confining animals and/or humans using spread spectrum signals; Robert G. Yarnall, Sr., et al., 119/721, 908; 340/573.3, 573.4 [IMAGE AVAILABLE]

=> d 124 3 ab detd(17) detd(24)

US PAT NO: 5,838,237 [IMAGE AVAILABLE] L24: 3 of 15

ABSTRACT:
A self-contained personal alarm device capable of signaling its location to a remote site such as a security station. The personal alarm device includes a housing enclosing a controller, an antenna, a cellular transmitter and a cellular receiver. The controller is coupled to the transmitter and receiver, which are in turn coupled to the antenna. The controller controls the transmitter and the receiver to receive position location signals such as **Global Positioning System** signals (**GPS**), establish a cellular connection with a remote site, and transmit device location data to the remote site on the cellular connection, wherein the device location data indicates the location of the device. The cellular connection is established via a cellular telecommunication network that includes an array of cell base stations. The **GPS** signals are transmitted to the device over the cellular network by providing each cell base station with a Differential **Global Positioning System** (DGPS) receiver. Using the DGPS receivers, **GPS** signals are repeated over the cellular network.

DETDESC:

DETD(17)

The personal **alarm** device 10 may further include a **vibrator** 310 coupled to the microprocessor 302. As will be described more fully below, the microprocessor 302 **vibrates** the **vibrator** 310 to assure the user that the device 10 has transmitted an emergency message.

DETDESC:

DETD(24)

After the data collector is polled, the data modifier 307 prepares an emergency message which is transmitted to the security station 40, as indicated by blocks 416 and 418. This includes combining the geo-coordinate data with the person **alarm** device MIN and ESN to generate the emergency message, modifying the emergency message and modulating the emergency message. The personal **alarm** device 10 then waits for an acknowledgment signal from the security station. If an acknowledgment signal is not received in a predetermined period of time, control moves to block 408 where the redial timeout interval is reset and the personal **alarm** device 10 attempts to retransmit an emergency message, as indicated by decision diamond 420. Thus, if the call is unsuccessful the microprocessor 302 will continually redial the security station 40 until an acknowledgment signal is received 420. When the

acknowledgment signal is received, the microprocessor activates the **vibrator** for 10 seconds to **alert** the user of the personal **alarm** device 10 that the distress call has been received, as indicated by decision diamond 420 and block 422.

=> d 124 8 ab bsum(15) bsum(23) detd(25)

US PAT NO: 5,769,032 [IMAGE AVAILABLE] L24: 8 of 15

ABSTRACT:

A confinement system for animals operates by transmitting a first predetermined spread spectrum modulated signal to a receiver mounted on an animal's collar. The spread spectrum modulated signal is despread demodulated. The data on the signal is removed and deciphered by the receiver to determine if the received signal is the correct discrete spread spectrum modulated signal. If the demodulated and reference signals are similar, then the signal strength of the first signal is used to determine whether the animal is close to a boundary area. If the spread spectrum modulated and reference signals are not similar, the first signal is ignored.

SUMMARY:

BSUM(15)

The foregoing illustrates the limitations known to exist in present confinement systems. Thus, it would be advantageous to provide an alternative confinement system which (1) uses a more effective and non-decipherable means of signal transmission accomplished by the use of spread spectrum techniques; (2) accounts for common and naturally occurring sources of unmodulated radio frequencies; (3) allows for the **tracking** of one or more **Personal** Monitoring Units (PMUs) within the confinement and/or monitoring area(s) or after the animal or human being monitored has left the predefined confinement area; (4) allows the owner or guardian to program each PMU with a Personal Identification Number (PIN) so that only the owner or guardian can **track** the animal or **human**; and (5) incorporates further energy saving methods for extended battery life of the PMU and constant voltage levels to the PMU's circuitry.

SUMMARY:

BSUM(23)

In another exemplary aspect of the present invention, a PMU is equipped with a spread spectrum location beacon transmission timer that allows signal transmission for a predetermined amount of time and/or number of times per minute, after the PMU has received the predetermined encoded signal from the PTU, additional land base regional antenna arrays, or low earth orbiting **satellites**. This energy saving device greatly conserves energy consumption of the PMU's battery.

DETDESC:

DETD(25)

Similar to wire 8, the strength of the signal (C) emitted from wire 7 varies with the distance from wire 7. As the animal 4 or human 5 approaches wire 7, the strength of the signal continuously increases and as the animal 4 or human 5 departs from wire 7 the strength of the signal decreases. The PMU 2 or 3 has a deterrent circuit responsive to a strength level of signal (C) which is preferably at least 5% of the predetermined transmission wattage of signal (C). Once the first strength level of signal (C) is detected, the signal is despread, then the encoded

sequence is verified and the deterrent circuit produces a deterrent, including an electrical shock, audio, and/or **vibration**, which acts upon the animal 4 or human 5 to, it is hoped, drive the animal 4 or human 5 away from the danger area 6. In addition, the PMU 2 or 3 transmits "Danger Area **Alarm**" spread spectrum encoded signal (I) which is received by the antenna wire 7 and provided to the home base 1. The ninth predetermined discrete spread spectrum modulated signal (I) has a different encoding from the predetermined spread spectrum modulated signals (A) through (H).

=> d 127 3

3. 5,731,757, Mar. 24, 1998, **Portable tracking** apparatus for continuous position determination of criminal offenders and victims; Hoyt M. Layson, Jr., 340/573.1, 539, 691.1, 825.3, 825.49; 342/357; 379/38; 701/212 [IMAGE AVAILABLE]

=> d 127 3 ab bsum(12)

US PAT NO: 5,731,757 [IMAGE AVAILABLE]   L27: 3 of 6

ABSTRACT:
A **portable locator** or **tracking** apparatus is provided for continuous location determination of subjects which communicates with a body-worn, non-removable, tamper resistant transceiver and a central data-base system. The **portable tracking** apparatus has a **Global Position System (GPS)** receiver and inertial sensors for determining location, microprocessors for logic and mathematical algorithm processing, memory for programs and data, a wireless transceiver for communications with the body-worn device, a wireless transceiver for communicating with the central data-base system, an alpha-numeric display for displaying text messages sent to the subject acoustic speaker and microphone for voice and tone messages with subjects, electronic tamper sensors, motion sensors, attitude position sensor, batteries and external connectors for power, recharge, communications and auxiliary antennas.

SUMMARY:

BSUM(12)

The **portable tracking** apparatus is enclosed within a housing having tamper proof screws holding a top and bottom cover in place. The housing contains a **GPS** antenna for communication with the **GPS satellite** constellation for determining the spatial coordinates of the **portable tracking** apparatus. A memory card with algorithms and a processor compares the current **location** of the **portable tracking** apparatus with schedule **rules** and **location constraints** for the subject. An antenna and transceiver communicates with a subject's body-worn device and the central data-base. A message display window on the **portable tracking** apparatus permits direct communication to the subject wearing the body-worn device. A motion detector communicates with the central data-base to notify the central data-base when the subject is in transit. A speaker and microphone provide tone and interactive voice communications with the subject.

=> d 130 1 3

1. 5,396,227, Mar. 7, 1995, Electronic system and method for monitoring compliance with a protective order; Gary T. Carroll, et al., 340/825.36, 573.4, 825.54; 379/38 [IMAGE AVAILABLE]

3. 4,952,913, Aug. 28, 1990, Tag for use with personnel monitoring system; James D. Pauley, et al., 340/573.4, 514, 825.49; 455/100 [IMAGE AVAILABLE]

=> d l33 5

5. 5,597,335, Jan. 28, 1997, Marine personnel rescue system and apparatus; Richard L. K. Woodland, 441/36; 114/345, 348; 441/38, 40, 83 [IMAGE AVAILABLE]

=> d l33 5 ab bsum(4) bsum(8) detd(47)

US PAT NO: 5,597,335 [IMAGE AVAILABLE] L33: 5 of 7

ABSTRACT:
The present invention provides for an air, sea, or land deployed rapid response, self-propelled, autonomous or semi-autonomous marine vehicle (AMV) possessing a pair of extendible hydraulic cylinders encased in a pneumatic inflation chute, with an ability to be directed toward, and to autonomously seek out and recover physically restricted persons in peril from an aqueous environment. The AMV uses video, thermal, and audio sensors to actively and autonomously detect persons floating in an aqueous environment, and can be directed to a person or persons in distress on the sea surface through an aircraft, ship, or shore mounted, **GPS** linked, laser targeting system. The present invention also possesses the ability to provide life support functions, propulsive mobility, and two way real-time radio frequency and **satellite** based voice, video and data telemetry with the rescue aircraft, ship, or shore based coordination center responsible for deploying, operating, or monitoring the AMV.

SUMMARY:

BSUM(4)

Every year several thousand people drown worldwide. These deaths are in many instances the result of exhaustion, dehydration, and hypothermia induced loss of coordination and consciousness which results in drowning. In other instances where survival is not affected by lower temperatures, the task of **locating**, assisting, and otherwise recovering **persons** in peril from an aqueous environment can be compounded by inclement weather, and environmental obstacles like fire, ice, or smoke which make approach to a potential drowning victim perilous to the life of the rescuer.

SUMMARY:

BSUM(8)

Various other shortcomings of marine rescue systems exist in the areas of deployment of the rescue craft, and detection and targeting of the victims. For example, existing air deployment systems are not compatible with externally mounted aircraft and helicopter bomb racks that would make air deployment efficient. As well, existing air, land, and sea deployed rescue systems do not posses an accurate targeting system to direct a self-propelled liferaft or self propelled lifeboat package to a shipwreck survivor or other person to be rescued. Where ship and oil rig deployed self propelled lifeboats are used, they are neither semi or fully autonomous, possessing the capability to use sensors and artificial intelligence to assist in **locating persons** in peril. Existing life rafts and self propelled lifeboats do not possess a self homing **GPS** capability to guide them to safe haven to facilitate occupant removal. Existing life rafts do not have the capability to use real-time

two way video, audio, informational data, search communications, and telemetry systems to administer direct remote control capability over the liferaft's or lifeboat's activities. Existing life rafts and lifeboats do not possess an autonomous self preservation collision and obstacle avoidance system utilizing radar, audio, and sonar based proximity warning sensor devices.

DETDESC:

DETD(47)

The position data of the person in peril is then relayed via radio, **satellite** or hardwire cable telemetry to the AMV apparatus 3.0 and sensor control console 1.0 which contains software programming instructions to automatically generate a data log on the person in peril. The log on the person in peril may contain specific data about the sex, age, **health**, injuries and overall condition of the person in peril. The AMV apparatus 3.0 and sensor array control console 1.0 also relays operator designated timing **interval** instructions to the targeting and sensor array 2.0 in order to maintain automated tracking and periodic position updates on the target person in peril. Hardware and software operator interface devices mounted on the AMV apparatus 3.0 and sensor array control console 1.0 then enable the operator to initiate launch of the AMV apparatus 3.0 from either ship, oil rig, aircraft, lighthouse, harbor, or other deployment platform utilizing an ADC, SDC, or no casing through either a ASCRP 6B, PRSDC 6E, XMADS 6C, IMADS 6D, SMLS 6G, or ORSMLS 6H deployment system. When the exact **location** of a target **person** in peril is unknown, said AMV apparatus 3.0 may be deployed to undertake user designated search patterns or to initiate autonomous operation utilizing its on board sensor capabilities to explore potential location leads pertinent to finding the target person(s) in peril.

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     (FILE 'USPAT' ENTERED AT 13:42:25 ON 07 APR 1999)
L1              7 S MATCH### FILTER###(P)GPS RECEIVER#
L2           1501 S FIELD PROGRAM? GATE ARRAY# OR FPGA
L3         119159 S (PERSON## OR INDIVIDUAL# OR BODY OR PORTABLE)(4A)(TRACK#
##
L4            234 S L3(P)TAMPER###
L5              0 S L4 AND L1
L6             56 S L3 AND L2
L7           3001 S (GLOBAL POSITION### SYSTEM OR GPS)
L8             38 S L7 AND L2
L9              1 S L8 AND L1
L10             0 S L9 AND L3
L11             1 S L8 AND TAMPER###
L12           981 S DATA MODEM#
L13             0 S L12 AND (L9 OR L11)
L14             1 S L12 AND L8
L15           163 S L3(P)L7
L16             0 S L15 AND L2
L17             1 S L15 AND L1
L18             0 S L17 AND TAMPER###
L19             0 S L4 AND L2
L20            42 S L3 AND L12
L21             0 S L20 AND L1
L22             0 S L20 AND L2 AND L7
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=> d l1 1-7

1. 5,884,214, Mar. 16, 1999, GPS receiver and method for processing GPS signals; Norman F. Krasner, 701/207, 214 [IMAGE AVAILABLE]

2. 5,825,327, Oct. 20, 1998, GPS receivers and garments containing GPS receivers and methods for using these GPS receivers; Norman F. Krasner, 342/357; 701/213, 215 [IMAGE AVAILABLE]

3. 5,691,957, Nov. 25, 1997, Ocean acoustic tomography; John L. Spiesberger, 367/3; 73/170.29; 367/5, 6 [IMAGE AVAILABLE]

4. 5,410,750, Apr. 25, 1995, Interference suppressor for a radio receiver; Robert H. Cantwell, et al., 455/306; 375/200, 349; 455/307, 311 [IMAGE AVAILABLE]

5. 5,373,531, Dec. 13, 1994, Signal acquisition and reception method for a global positioning system signal; Kenichiro Kawasaki, 375/200; 342/357; 380/34 [IMAGE AVAILABLE]

6. 5,117,232, May 26, 1992, Global system positioning receiver; Robert H. Cantwell, 342/357 [IMAGE AVAILABLE]

7. 4,807,256, Feb. 21, 1989, Global position system receiver; Jerry D. Holmes, et al., 375/344; 342/357 [IMAGE AVAILABLE]

=> d l1 1-7 kwic

US PAT NO: 5,884,214 [IMAGE AVAILABLE] L1: 1 of 7

CLAIMS:

CLMS(23)

23. A computer readable medium containing a computer program having executable code for a global positioning system (**GPS**) **receiver**, said computer program comprising:
first instructions for receiving GPS signals from in view satellites, said GPS signals comprising pseudorandom (PN) codes;
second instructions for computing pseudoranges from said received GPS signals using a conventional **GPS receiver**;
third instructions for detecting when said **GPS receiver** is experiencing blockage conditions and digitizing said GPS signals at a predetermined rate to produce sampled GPS signals in response. . . said sampled GPS signals in a memory; and
fifth instructions for processing said sampled GPS signals, said fifth instructions comprising a **matched filtering** operation to determine the relative timing between said PN codes and locally generated PN reference signals, said processing comprising performing. . .

US PAT NO: 5,825,327 [IMAGE AVAILABLE] L1: 2 of 7

DETDESC:

DETD(55)

At . . . are selected based upon their signal-to-noise ratios (SNR's). The SNR may be computed as the signal power out of the **matched filter** (or correlator) divided by background noise level. The latter may be computed as the mean-squared **matched filter** output for delays away from the peak output. An estimate of RMS position error, (e.g. latitude and longitude) may be. . . the pseudorange SNR's with the approximate positions of the satellites corresponding to such pseudoranges and the approximate position of the **GPS receiver**. Such methods are well known in the art and are discussed, for example, in Global Positioning System, Theory and Applications,. . .

US PAT NO: 5,691,957 [IMAGE AVAILABLE] L1: 3 of 7

SUMMARY:

BSUM(18)

The . . . different day. Before a source is due to transmit, the system comes out of low-power state and turns on the **GPS receiver**. Using the current time and position from the **GPS receiver** the estimated travel time from the source is computed using a data base of average sound speed. This time, approximately. . . is transferred over the communication cable to the bottom electronics package using the one pulse per second output from the **GPS receiver**. The bottom system then knows exactly when to begin collecting acoustic data, and that time is saved with the output. . . When the reception is complete, the analog system is turned off and the DSP activated. The tomography data are beam-formed, **match-filtered** and processed for Doppler shift by the DSP. Peaks are picked from the processed data and their arrival time, signal-to-noise. . .

US PAT NO: 5,410,750 [IMAGE AVAILABLE] L1: 4 of 7

DETDESC:

DETD(3)

The . . . received signal and feeds it to the receiver IF front-end section 16 where the RF signal is down converted and **match filtered** to the information or spread spectrum bandwidth F.sub.o. The

IF output is a signal 17F.sub.o, where F.sub.o equals 10.23 MHz.. . . a plurality of signal processor channels. The digital processor 22 estimates the pseudo range and pseudo range rate of the **GPS receiver** relative to each satellite. It provides an analog and a digital automatic gain control (AGC) signal to the receiver IF. . .

US PAT NO: 5,373,531 [IMAGE AVAILABLE] L1: 5 of 7

ABSTRACT:

A signal acquisition method for a **GPS receiver** which eliminates the necessity of a clock circuit for keeping the current time and also a backup battery for memory. . . According to the signal acquisition method, upon starting of acquisition of a GPS satellite after the power source to the **GPS receiver** is turned on, using a **matched filter**, an acquisition operation is performed for objects of all of GPS satellites which may possibly be disposed until after a. . .

SUMMARY:

BSUM(47)

In . . . object described above, according to an aspect of the present invention, there is provided a signal acquisition method for a **GPS receiver**, which includes the step of performing, upon starting of acquisition of a GPS satellite after the power source to the **GPS receiver** is turned on, using a **matched filter**, an acquisition operation for objects of all of GPS satellites which may possibly be disposed until after a signal of. . .

SUMMARY:

BSUM(50)

According to another aspect of the present invention, the signal acquisition method is performed efficiently with a **GPS receiver** circuit for a **GPS receiver**, which includes a radio frequency circuit for producing an intermediate frequency signal from a signal from a GPS satellite and a code search circuit constituted from a **matched filter** and operable when the power source to the **GPS receiver** is turned on to start acquisition of a signal of a **GPS receiver** for searching a code phase of the intermediate frequency signal from a signal being received from a GPS satellite to. . . acquired by the code search circuit, and a means for performing a synchronous tracking operation for the signal from the **GPS receiver** are also included in the **GPS receiver** circuit for a **GPS receiver**.

DETDESC:

DETD(2)

Referring first to FIG. 1, a signal processing circuit for a **GPS receiver** is illustrated to which a signal acquisition method according to the present invention is applied. The signal processing circuit is. . . 32 provided in the conventional signal processing circuit of FIG. 4. The code search circuit 33 is constituted from a **matched filter** which operates in response also to an IF signal sampled with an asynchronous carrier, and performs searching of a code. . .

CLAIMS:

CLMS(1)

What is claimed is:

1. A signal acquisition method for a **GPS receiver**, comprising the steps of:
searching, upon starting of acquisition of a GPS satellite after the power source to said **GPS receiver** is turned on, for a code phase of a signal in a range of all code phases for one period of the code, by using a **matched filter**; and
continuing said searching for all GPS satellites, which may possibly be disposed, as objects for searching without calculating tracks of. . .

CLAIMS:

CLMS(2)

2. A **GPS receiver** circuit for a **GPS receiver**, comprising:
a radio frequency circuit for producing an intermediate frequency signal from a signal being received from a GPS satellite;
a code search circuit including a **matched filter** operable when the power source to said **GPS receiver** is turned on to initiate acquisition of a signal of a **GPS receiver** and being capable of searching for a code phase of said intermediate frequency signal in a range of all code. . .

US PAT NO: 5,117,232 [IMAGE AVAILABLE] L1: 6 of 7

SUMMARY:

BSUM(6)

An all-digital **GPS receiver** is described in a paper entitled "All-Digital **GPS Receiver** Mechanization", by Peter C. Ould and Robert J. Van Wechel, reprinted by the Institute of Navigation, Global Positioning System Papers. . . Vol. 2, pp. 25-35, (also presented at ION Aerospace Meeting, April, 1981). Code correlation is accomplished digitally using either digital **matched filters** (DMF) or digital correlators, depending upon performance requirements. In particular, a correlator is described that is a three-sample, 2-bit correlator. . . bit (MSB) and least significant bit (LSB) independently. However, this approach requires one correlator/integrator in the signal processor of the **GPS receiver** for each analog-to-digital bit. In a subsequent paper entitled "All-Digital **GPS Receiver** Mechanization-Six Years Later by J. S. Graham, P. C. Ould and R. J. Van Wechel, Journal of Institute of Navigation,. . .

US PAT NO: 4,807,256 [IMAGE AVAILABLE] L1: 7 of 7

SUMMARY:

BSUM(7)

In addition, an experimental **GPS receiver**/digital processing system has been operated. The basic technical approach of this receiver consists of a broadband, fix-tuned RF converter followed by a digitizer, digital-**matched-filter** acquisition section; phase- and delay-lock tracking via baseband digital correlation; software acquisition logic and loop filter implementation; and all-digital implementation. . . frequency. Those persons skilled in the art desiring more information concerning this receiver are referred to Ould and VanWechel, "All-Digital **GPS Receiver** Mechanization", Navigation: Journal of The Institute of Navigation, Vol. 28, No. 3, at 178, Fall 1981.

=> d 19

1. 5,884,214, Mar. 16, 1999, **GPS** receiver and method for processing

third instructions for detecting when said **GPS receiver** is experiencing blockage conditions and digitizing said **GPS** signals at a predetermined rate to produce sampled **GPS** signals in response thereto;

fourth instructions for storing said sampled **GPS** signals in a memory; and

fifth instructions for processing said sampled **GPS** signals, said fifth instructions comprising a **matched filtering** operation to determine the relative timing between said PN codes and locally generated PN reference signals, said processing comprising performing a plurality of convolutions on a corresponding plurality of blocks of said sampled **GPS** signals to provide a plurality of corresponding results of each convolution and summing a plurality of mathematical representations of said plurality of corresponding results to obtain a plurality of pseudoranges.

=> d l11

1. 5,794,164, Aug. 11, 1998, Vehicle computer system; Richard D. Beckert, et al., 455/456; 701/36 [IMAGE AVAILABLE]

=> d l11 ab detd(23) detd(32)

US PAT NO: 5,794,164 [IMAGE AVAILABLE] L11: 1 of 1

ABSTRACT:
A vehicle computer system has a housing sized to be mounted in a vehicle dashboard or other appropriate location, a computer mounted within the housing, and an open platform operating system which executes on an open hardware architecture computer. The open platform operating system supports multiple different applications that can be supplied by a vehicle user. For instance, the operating system can support applications pertaining to entertainment, navigation, communications, security, diagnostics, and others. The computer has one or more storage drive (e.g., CD drive, floppy disk drive, cassette player, or hard disk drive) which permits the vehicle user to download programs from a storage medium (e.g., CD, diskette, cassette, or hard disk) to the computer. In the described implementation, the computer has two independent processors. One processor, which runs the operating system, is mounted in a stationary base unit of the housing and the other processor is mounted to a faceplate which is detachable from the base unit. When the faceplate is attached, the first processor provides the primary control over all operating systems (i.e., entertainment, navigation, communications, security, diagnostics, and others) and the faceplate processor is subservient. When the faceplate is detached, it forms a portable RF device with the faceplate processor providing radio and communications capabilities.

DETDESC:

DETD(23)

The DSP 80 is coupled to a **field programmable gate array** (**FPGA**) 306 which coordinates data flow on the faceplate module. The **FPGA** 306 is coupled to the data bus interface 308 and the radio bus interface 310 which form part of the electrical interface 82 that connects to the first interfacing slot 70 of the support module 62. The data bus interface 308 also provides connection to any internal components embedded in the faceplate module 60, such as the cellphone chipset 85. The faceplate module 60 also has an IrDA interface port 312 coupled to the IrDA port 56 to convey the data to the computer module 64, as described below. This IrDA interface 312 is also part of the electrical interface 82.

GPS signals; Norman F. Krasner, 701/207, 214 [IMAGE AVAILABLE]

=> d 19 ab detd(18) clms(23)

US PAT NO: 5,884,214 [IMAGE AVAILABLE] L9: 1 of 1

ABSTRACT:
A **global positioning system** (**GPS**) receiver has first circuitry for receiving and processing pseudorandom sequences transmitted by a number of **GPS** satellites. The first circuitry is configured to perform conventional correlation operations on the received pseudorandom sequences to determine pseudoranges from the **GPS** receiver to the **GPS** satellites. The **GPS** receiver also includes second circuitry coupled to the first circuitry. The second circuitry is configured to receive and process the pseudorandom sequences during blockage conditions. The second circuitry processes the pseudorandom sequences by digitizing and stoning a predetermined record length of the received sequences and then performing fast convolution operations on the stored data to determine the pseudoranges. The **GPS** receiver may have a common circuitry for receiving **GPS** signals from in view satellites and downconverting the RF frequency of the received **GPS** signals to an intermediate frequency (IF). The IF signals are split into two signal paths; a first of which provides the conventional correlation processing to calculate the pseudoranges. During blockage conditions, the IF signal is passed to the second signal path wherein the IF signals are digitized and stored in memory and later processed using the fast convolution operations to provide the pseudoranges. Alternative arrangements for the two signal paths include separate downconverters or shared digitizers. One embodiment provides both signal paths on a single integrated circuit with shared circuitry executing computer readable instructions to perform **GPS** signal processing appropriate to the reception conditions.

DETDESC:

DETD(18)

Upon detecting the reduced signal to noise levels of received **GPS** signals, or under user command entered through front panel controls 44, conventional **GPS** receiver 12 signals microprocessor 34 that it is encountering a blockage condition. Upon receipt of such a signal, microprocessor 34 configures **GPS** receiver 10 to operate in the snapshot mode. When the **GPS** receiver 10 enters the snapshot mode, microprocessor 34 activates switch 18 so as to provide a signal path to the circuitry which makes up snapshot **GPS** receiver 14. This circuitry includes analog to digital converter (A/D) 46, digital snapshot memory 48, general purpose programmable digital signal processor (DSP) 52, program EPROM 54, **field programmable gate array** (**FPGA**) 56, frequency synthesizer 58 (which is also used in conjunction with conventional **GPS** receiver 12 to provide a local oscillator for RF to IF downconverter 20), battery and power control circuit 60 and microprocessor 34 (which may also control the operations of conventional **GPS** receiver 12).

CLAIMS:

CLMS(23)

23. A computer readable medium containing a computer program having executable code for a **global positioning system** (**GPS**) **receiver**, said computer program comprising:
first instructions for receiving **GPS** signals from in view satellites, said **GPS** signals comprising pseudorandom (PN) codes;
second instructions for computing pseudoranges from said received **GPS** signals using a conventional **GPS receiver**;

DETDESC:

DETD(32)

The computer module 64 has a navigation system 112 which includes both a **GPS (global positioning system)** receiver and a map application, such as Automap.TM., a program produced by Microsoft Corporation. A security system 114 is provided in the computer module 64 to manage vehicle security. The security system 114 monitors the security sensors 26 (FIG. 1) for any potential threat of theft or vandalism. The security system 114 is connected to actuators which lock/unlock doors and windows, and to an alarm which can be activated upon detection of unwanted **tampering**.

=> d 114

1. 5,842,125, Nov. 24, 1998, Network control center for satellite communication system; Edward J. Modzelesky, et al., 455/426, 428, 430 [IMAGE AVAILABLE]

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=> d 117

1. 5,825,327, Oct. 20, 1998, GPS receivers and garments containing GPS receivers and methods for using these GPS receivers; Norman F. Krasner, 342/357; 701/213, 215 [IMAGE AVAILABLE]

=> d 117 ab bsum(7) detd(55)

US PAT NO: 5,825,327 [IMAGE AVAILABLE] L17: 1 of 1

ABSTRACT:
A GPS receiver having multiple GPS antennas. Also described is a method of tracking employing the GPS receiver and a communication transmitter. Also described is a garment having a GPS receiver and a GPS antenna and a communication antenna and a communication transmitter.

SUMMARY:

BSUM(7)

The combination of **GPS** systems and other communications is receiving considerable interest, especially in the areas of **personal** and property **tracking**. An example of such a combination is shown in U.S. Pat. No. 5,225,842. The communication link allows a **GPS** receiver located on a mobile person or object to transmit its accurately determined position to remote locations which monitor this activity. Applications of the technology include security, truck fleet tracking, emergency response, inventory control, etc. The prior art has performed such combinations by mating separate **GPS** receivers and communication systems using suitable electronic interfaces between the two, for example, serial communication ports, etc. Moreover, these systems use conventional serial correlating approaches to acquiring and tracking **GPS** satellite signals.

DETDESC:

DETD(55)

At step 132, the system determines whether multiple GPS antennas have

been used to collect and process different collections of GPS signals. If multiple GPS antennas have not been so used, then processing proceeds to step 134. If multiple GPS antennas have been so used, then the system determines in step 132 the selected position information. Pseudoranges are calculated for each satellite in view and for each buffered set of samples. We term the pseudoranges found for a buffered set of data a pseudorange group (PRG). Pseudoranges are selected based upon their signal-to-noise ratios (SNR's). The SNR may be computed as the signal power out of the **matched filter** (or correlator) divided by background noise level. The latter may be computed as the mean-squared **matched filter** output for delays away from the peak output. An estimate of RMS position error, (e.g. latitude and longitude) may be determined without solving the navigation equations by combining the pseudorange SNR's with the approximate positions of the satellites corresponding to such pseudoranges and the approximate position of the **GPS receiver**. Such methods are well known in the art and are discussed, for example, in Global Positioning System, Theory and Applications, Vol. I, Chapter 5, by B. W. Parkinson and J. J. Spilker (American Institute of Aeronautics and Astronautics, c 1996).